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Mean Places of the Stars of Comparison used at Durham, and of certain other stars near the path of *Metis*, during the opposition of 1850–1, observed on the meridian at Durham: *—

Set.	Name.	Mag.	R.A. (1851·0). h	m	s	N.P.D. °	′	″	No. of Obs.
	(*a*)	8	9	4	53·57	65	5	48·2	1
14, 15	Lalande 18184	6		5	46·60	64	22	27·9	3
	Lalande 18259	9		8	5·83	64	44	40·4	3
	Lalande 18482	8		15	43·66	65	47	4·8	1
	(*b*)	9		16	36·45	64	37	39·6	3
13	(*c*)	8		21	30·35	64	40	15·8	3
11, 12	(*d*)	9		22	55·32	64	55	56·5	2
9	(*e*)	10		28	9·88	65	2	6·4	†
	(*f*)	8		29	2·60	64	56	11·9	3
7, 8	(*g*)	9		29	24·70	65	15	59·4	2
5	B.A.C. 3327	7		36	47·17	65	50	32·8	2
	Lalande 19329	8		44	27·84	66	40	56·1	5
	Lalande 19522	7		51	9·92	67	58	10·0	4
	B.A.C. 3423	7		54	30·00	67	20	1·9	1
4	Lalande 19677	9	9	56	55·60	69	21	50·7	2
2	(*h*)	9	10	0	3·24	70	30	30·5	2
1	B.A.C. 3460	7		0	57·40	70	44	21·4	2
	Lalande 19900	9		6	58·83	70	8	16·8	1
3	γ' Leonis	2	10	11	45·05	69	24	25·4	4

BIELA'S COMET.

Extract of a Letter from Professor Santini of Padua to the Astronomer Royal.

"1851, *April* 3.

"Some time ago, I took the liberty of sending you the elements of the periodic comet of Biela for 1852, in which I had included the effect of the perturbations depending on *Jupiter* and *Saturn*. I have subsequently calculated the alterations depending on the earth and *Venus;* I have not, however, thought it necessary to take notice of those produced by *Mars*, both on account of the smallness of its mass, and because, during the revolution from 1846 to 1852, it is always at a great distance from the comet. The values of the alterations produced by *Jupiter*, *Saturn*, the earth, and *Venus* (ac-

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* "Star (*a*) was kindly observed for me at Cambridge by Mr. Breen.

† "The place of Star (*e*) depends on a single comparison with (*f*); it was too faint for the transit. The other stars were observed during February last, and would have been based on more observations had I not been suddenly suspended from work by illness. The corrections to *Nautical Almanac* stars, at present in use at Greenwich, were applied throughout in finding clock-error.

"I should state, in reference to the star-observations, that I find the average error of a single observation of a *Nautical Almanac* star, with the Durham transit-circle, to be in R.A. ± $0^s{\cdot}05$, and in N.P.D. ± $1''{\cdot}0$, the circle being small. The N.P.D.s are obtained differentially from *Nautical Almanac* stars, the *zero* of the circle being too unstable for independent measures of *zenith* distance."

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cording to my results), will be inserted in an article of the *Astronomische Nachrichten*, which, since the melancholy decease of our veteran colleague Schumacher, are continued by Mr. Petersen; I therefore take the liberty of sending you the elements last obtained, with the addition of the alterations depending on the earth and *Venus*, accompanied with an ephemeris for the search of the comet at its next appearance, which I hope will prove sufficiently exact. I have not thought it advisable to continue it beyond September 30, because it will be necessary to correct the elements after the first observations, and then a new ephemeris founded on the corrected elements may be more convenient.

Elliptic Elements for the Mean Equinox of 28 *September*, 1852.

Perihelion Passage	T = 1852, Sept. 28·68134, Greenwich Mean Time		
	° ′ ″		
Longitude of Perihelion	π =	109 8 21·49	
— of Ascending Node	ω =	245 52 29·32	
Inclination to the Ecliptic..	i =	12 33 16·56	
Angle of Eccentricity	φ =	49 8 6·36	log e = 9·8786679
Daily Sidereal Motion	n =	534″·813993	log a = 0·5478692

"In the calculation of the ephemeris, the following constants have been adopted:—

"1. In the computation of the true anomaly v and radius vector r, by means of the eccentric anomaly E, from the equations

$$\sin\frac{v}{2}\cdot\sqrt{r} = \mathrm{A}\sin\frac{\mathrm{E}}{2}$$

$$\cos\frac{v}{2}\cdot\sqrt{r} = \mathrm{B}\cos\frac{\mathrm{E}}{2}$$

I have used log A = 0·3962283, log B = 9·9674029.

"2. For the calculation of the right ascensions and the geocentric declinations referred to the true equinox, the values of the solar co-ordinates referred to the equator are taken from the *Nautical Almanac*, 1852; and the heliocentric co-ordinates of the comet referred to the plane of the equator, measured from the true equinox, are computed by means of the following formulæ:—

$$x = m\,.\,r\sin(v+\mathrm{M});\quad y = n\,.\,r\,.\sin(v+\mathrm{N});\quad z = p\,.\,r\,.\sin(v+\mathrm{P});$$

the constants m, n, p, M, N, P, deduced from the elements above, being given by the following table:—

1852.	M. ° ′ ″	Log m.	N. ° ′ ″	Log n.
June 30	198 36 34·7	9·9912824	104 51 57·2	9·9785000
Aug. 29	36 43·7	·9912819	52 5·3	·9784978
Oct. 28	36 49·8	·9912817	52 11·4	·9784961
Dec. 27	198 36 59·6	9·9912813	104 52 20·0	9·9784957

	P. ° ′ ″	Log p.
June 30	139 37 53·8	9·5629343
Aug. 29	38 0·3	·5629502
Oct. 28	38 5·8	·5629585
Dec. 27	139 38 14·3	9·5629684

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